A Study to Determine Correlation between Physical and Mental Proficiencies, and the Correlation Between Physical Proficiency and Leadership and Mental Proficiency and Leadership.

By

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C O N T E N T S

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I N D E X T O F I G U R E S

I N T R O D U C T I O N

One of the most wonderful tendencies in Education during the past decade has been the development of a body of quantitative technique which makes constant use of statistical method of study. The Subjective method is fast being replaced by the Objective. Research in every form is being made to conform to the scientific method.

In some phases of Education, however broad generalizing statements, unsupported by scientific facts, are still employed, and indulged in.

Among other problems which have been subjected to this method is the general problem of the physical capacities and limitations of the child.

In more recent years certain phases of this subject have been investigated and measured by scientific methods. This has been particularly true in the movement for health supervision — a movement begun in Europe and more recently undertaken in the United States, with the result that every state in the Union now has some sort of physical examination and supervision.

The justification for the expenditure of effort on such an investigation as I have undertaken is at once apparent. If a definite and significant correlation exists, a determination of this correlation should be of large value in governing educators in directing and correlating these two phases of educational effort. If the student's academic attainment is greater because of greater physical proficiency then certainly it is worth while to give large consideration to the improvement of those physical capacities which will contribute to the higher academic attainment.

John Dewey [24] indicates that little is definitely known in the field. Holmes writes, "There is at least some evidence to show that mental superiority goes with physical superiority." [3]

Hollingsworth says, "Literature on the subject of the relationship between the physical and the mental is very meagre. In no branch of child study is research more needed and at the same time more conspicuously lacking." [4]

I have been convinced for a long time that participation in athletics is an important and

significant factor as a moral and academic contributant. This, however, is no criterion of the existance of a definite correlation between physical and mental proficiency. In the first place only a relatively small per cent of the students actually participate in athletics and these are the ones who have met the academic requirements of the school and of the State Athletic Associations. In the second place the girls are practically entirely excluded from such an analysis.

During the school year of 1924-1925 and 1925-1926 among three hundred students, boys and girls, in the Ottawa Senior High School, I conducted a study to determine, if possible, if any or what correlations exist between the aforementioned qualities according to the criteria used in this study.

Chapter I

Related Literature and Tests

The literature on the subject is meagre and an examination of it reveals the fact that very little real investigating has been done.

Large interest in methods of measuring mental and physical capacities of mankind is manifesting itself in America, as a result of the increased interest in the physical side in Education. Edward C. Schneider, in the American Physical Education Review for November, 1923, points out that "Standards of fitness and the tools for making the measurements are called for on every side. The psychologist busy with his intelligence tests has quite persuaded himself that he can so measure mental capacity with his yardstick, that boys and girls may be guided into certain vocations on the basis of these tests. Some believe that the physical working capacity and the physical efficiency of the individual can likewise be measured." 16

A number of studies bearing on the general subject have been made, but for the most part they have been made with reference to special physical characteristics and with particular phases of mental development, failing, therefore, to develop any general formula for measuring general physical efficiency that seems to be at all satisfactory.

For example, by a method developed by Briggs it is possible to determine the crestload, that is, the maximum number of foot-pounds of work per minute, that can be done with a maintenance of oxygen balance, for any individual. But the test requires the use of methods of colorimetric metabolism and can therefore be made only by experts in gas analysis and consequently cannot be employed in very general use.

In a study by Dr. Bird T. Baldwin [17], Director of the Iowa Child Welfare Research Station, reported in the 23d Year Book of the National Society for the Study of Education, he indicates that children of the same chronological age may differ in stages of physiological development. A study of several thousand individual growth curves, based upon repeated measures of the same children shows

that as a rule tall children remain tall and short children remain short. Tall children reach their final stature earlier than short children. They are accelerated physiologically, that is, tall children are physiologically older than short children. Girls reach their period of final stature earlier than boys and are, therefore, older, as a rule, physiologically than boys. The conclusion that if pedagogical age be accepted as a fair equivalent to mental development, tall, heavy boys and girls with good lung capacity are older physiologically and farther along in their stages toward mental maturity, as evidenced by school progress, than short, light boys and girls, is based on 21,682 final term grades and 5,000 physical measurements on 135 boys and girls from the Horace Mann School at Teachers College, Columbia University, and the Francis Parker School in Chicago for a period of five to ten years for each child.

In a report of observations in the John Hopkins Demohstration School, composed mostly of misfit pupils of retarded or average ability, the coefficient of correlation between height and intelligence rating for groups of boys and groups

of girls ranging between six and fourteen years of age was .71 and .72 respectively.

In a study [17] under the direction of the Iowa Child Welfare Research Station of mental and physical growth curves on a group of normal and superior children measured by the Standord-Binet Scale over a period of years, it was found that the mean "mental age" of children above the average in standing height, is higher than the mean "mental age" of the average children.

Boas [24], at Toronto, found no relation between height or weight and mental precocity.

Cyrus D. Mead [5], has produced evidence that mentally precocious children learn to walk and talk earlier in life, are taller and heavier, have a stronger grip and are more decidedly unidextrous.

These studies show that, as a general rule, good mental development accompanies good physical growth during childhood.

In the matter of actual tests in determining correlations a few may be mentioned.

Dorothy Emma Westendorf [7] of Grand Rapids, Michigan, devised a physical efficiency test by which she proposed to measure agility, coordination, strength, speed and endurance. One part of the test, called the "Agility Test," consisted of (1) a jump over a rope two feet from the floor, (2) climbing a rope ladder, (3) tumbling, (4) crawling under a horse.

Another part of the test called the "Coordination Test," of a horizontal bar performance. Correlation of the results of these tests with mental tests were as follows:

Agility time and the Thorndike Mental Test	.02
" " " " Terman " "	.23
" " " " School Marks " "	.29
Coordination and Thorndike Mental Test	.16
" " Terman " "	.11
" " School Marks" "	.18

The above correlations were secured from twenty-five Freshman girls.

Landis, Burt and Nichols [8] of Ohio State University, studying 559 college students, found a correlation between mental test scores and scores from a physical test comprised of (1) 100 yd. dash,

(2) running broad jump, (3) baseball throw and (4) a fence clinch to be with 100 yd. dash .01, with broad jump, .03, with baseball throw, .04, and with fence clinch, .07.

D. A. Sargent [1] of the Sargent School for Girls, Cambridge, Massachusetts, developed a test that according to experts went farther than other previously developed tests. This test consisted of a single vertical high jump, executed as follows: The individual to be tested assumed a crouching position with the muscles of the back, legs and ankles relaxed and his arms drawn back. When the signal is given he straightens his legs and back and throws his arms forward, projecting his body into the air. He is given a number of trials and the farthest distance above his head at which he is able to touch his head to a cardboard disc, which is held above his head, is taken as the measure of his performance on this test. This distance in inches is used by Dr. Sargent as a basis for computing the index of physical proficiency. The formula for computing the index is

$$\text{Index} \quad \frac{\text{height of jump X weight}}{\text{height in stature}}$$

Geo. Hielto, Supervisor of Physical Education at Berkeley, California, says, "Like intelligence

physical capacity is a complex quality. It may be resolved into its constituent elements, strength or power to exert force; endurance, or power of sustained action; and skill, or muscular coordination" [11].

This method of measurement, that is, the Sargent method, seems quite inadequate inasmuch as it does not measure all the constituent elements.

As a result of this attitude, and feeling, John L. Englehardt [24] of Kansas University in 1923, with the cooperation of the School of Education and the Physical Education Department, devised a piece of apparatus by means of which he could more accurately and satisfactorily measure physical proficiency as a part of a study in correlations between physical and mental proficiencies.

An analysis of this device will disclose the fact that Englehardt has removed most of the inadequacies of former physical measurement tests, and that a physical test comparable for example to the Terman Mental Test is now available.

Very briefly, Englehardt's device consists of a head-gear, having an elastic band for the head

and under the chin, which is drawn over the subject's head, and the band is snapped under the chin. A clamp on the cord, fastened to the head gear, is attached so that the cord may be lengthened or shortened according to the height of the individual.

A circle two feet in diameter is marked on the floor directly beneath the pulley, attached to the ceiling, over which the cord attached to the head gear is run.

The subject is instructed to stay inside this circle and to jump as high and as fast as he can after the signal "Go" is given, and not to stop between jumps but to stop when the signal "Stop" is given. He is also instructed to use his arms as in the Sargent test. This arm movement is insisted upon to standardize the jump and to bring as many muscles into play as possible.

A detailed description of this apparatus is given on page 16.

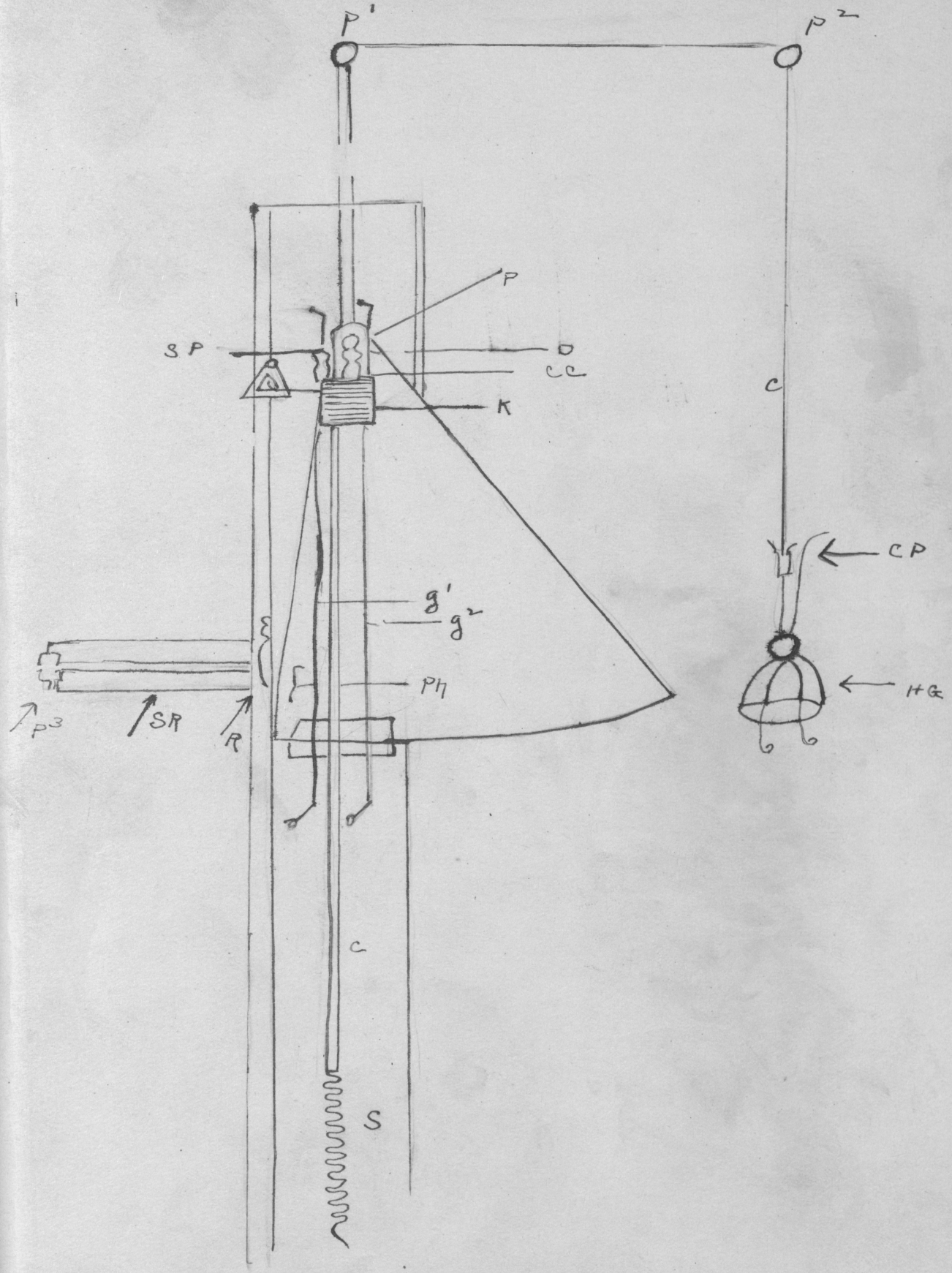
See an explanation of the Englehardt device in Figure I.

The purpose of the device is to record an accurate measure to heights of successive jumps in a record sheet. The recording is done by a pencil underneath K. The spring (s) keeps the cord (e) taut at all times. This cord con-

tinues from (S) through "K", "D", "p^1", "p^2",. and "C_p" to "Hg". "D" is securely clamped to the cord. "K" has a cylinder opening through the center, through which the cord passes freely. "K" slides up and down on brass rods "g" and "g^2" with little friction after oiling them. The pencil beneath "K" is held lightly against the record sheet by a small expansion spring, which develops a light line with practically no friction.

After fitting the head gear (Hg), "K" is raised and held by Sp. D. is lowered by means of "Cp" until it snaps into "cc". The subject is given the signal "Go!". He crouches. D is released and rises. Subject jumps. D again clamps into "cc", carries K down guides (g^1, g^2) a distance equal to the height of the jump leaving a mark of the length on the record sheet. As the subject returns to a crouching position ready for the jump again, K returns to Sp (the pencil retracing the line made going down). "D" is released from "cc", K lifts "S" which in turn shifts "B" to the left and all is ready for a second jump. This process continues until the signal "Stop!" is given. The record sheet held in place by "p", "ph^1" and "Ph^2" is then removed and a new sheet placed on mental plate "B".

DIAGRAM I



The rest of the apparatus which is difficult to explain without having it before you, is arranged to record the number and height of the jumps by marking on a sheet of paper fastened on a sheet of metal. With each jump a lever shifts the sheet, so that a new mark is recorded with each jump.

The test is continued for fifteen seconds, and at the end of this time the stop signal is given.

The sheet is then removed and the jumps counted and measured.

The sum of the jumps in inches divided by the number of jumps gives the average height of each jump, and the total number of inches divided by fifteen (the number of seconds) gives the number of inches jumped per second.

Englehardt validated the efficiency of his test by a determination of the correlation between the results of his test and the ranking given by nine athletic instructors in the Physical Education Department of the University of Kansas, and by a self correlation test. In the first instance he found it to be .71. He further validated it by a correlation between the ranking

of the physical instructor at the Lawrence Junior High School and the results from this test and found the correlation to be .64, and with a self correlation on the same group he found the correlation to be .76.

As a result of various correlations he determined the index

$$\frac{\text{Average height of jump X weight}}{\text{height}}$$

to be the index of physical efficiency that should be employed in the case of college students and the index for Junior High School boys to be $\frac{S \text{ X weight}}{\text{height X age}}$. Englehardt found, as a result of his physical tests applied to twenty-nine University men and a mental test as measured by the Otis Group Intelligence Test given to the same group of men, no correlation.

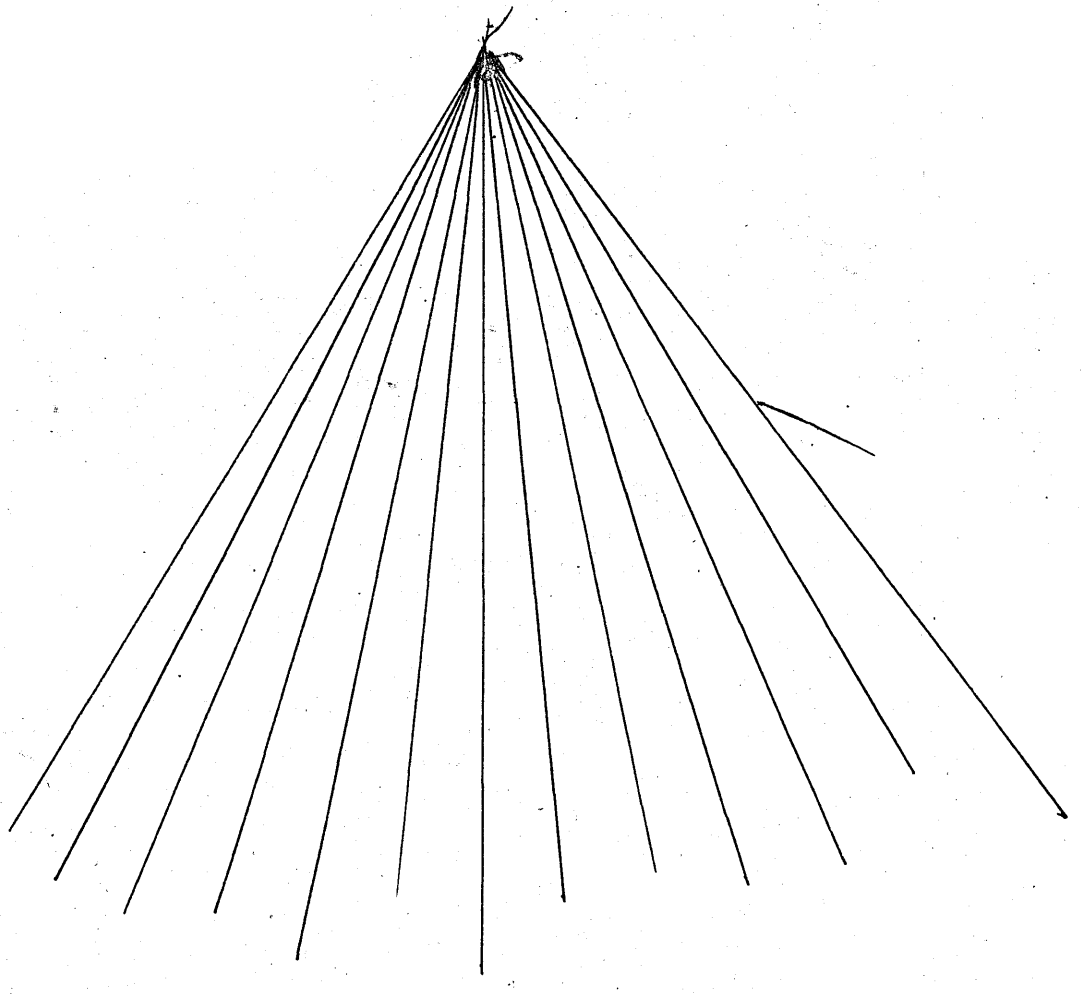
For the Junior High School boys he found that physical efficiency has no correlation with mental efficiency as measured by the Binet Mental Test. He did find, however, a small correlation of .29 between physical efficiency and mental efficiency as measured by the Composite based on School Marks for one semester.

D I A G R A M II

Formula used to determine physical index.

$$\text{Index} = \frac{\text{av. ht. of jump} \times \text{weight}}{\text{age} \times \text{height}}$$

$$\text{Av. ht. of jump} = \frac{\text{total jumps in inches}}{\text{total number of jumps}}$$



Record sheet measuring jumps.

The validity of Englehardt's test seems to me to be well established, but the validity of his correlation determination might possibly be questioned inasmuch as his experimentation was conducted with a relatively small group of University men and a relatively small group of Junior High School boys. As a continuation of this investigation, and employing the same general devices, I have presumed to determine additional correlations involving the age and sex factors and also the factor of qualities of leadership.

As indicated previously the need of such an investigation is apparent. Thorndike [25] points out his belief that there are three types of innate intelligence, namely, abstract intelligence, social intelligence and motor intelligence, and that these types are positively related, but not in a high degree. The first of these qualities would manifest itself in thinking, the second in feeling and the third in doing.

Individuals differ with respect to their tendency to respond to situations in terms of these three methods. There is not a uniform ratio between these three qualities in all individuals.

An individual of average tendency toward efficiency in thinking might be above or below average in his tendency toward efficiency in motor activity or vice versa.

S. S. Colvin [26] in his argument for a "psychological profile" of each individual indicates his belief to be that there are special abilities that are not closely related to other abilities, and that for this reason an individual cannot be treated as a unit, but that he must be discovered in his various tendencies and abilities and in order to know him as he is, we must evolve his "physiological profile," showing both his high and his low points.

If, as these psychologists believe and as Englehardt points out, there is a positive though not high correlation between the motor and the mental qualities at birth, it is apparent that from the beginning, when the child first makes responses the tendency toward one type of response, because of the satisfyingness connected with it, will tend to make it predominate. If no check or annoyingness is attached to this type of response, other types of response which originally existed and a definite positive relationship that may have

existed, may gradually disappear.

For example, a boy is originally fond of motor activity and fairly fond of mental activity. His original fondness for motor activity is encouraged by attaching particular satisfyingness to it and the opportunities are made abundant, while to his intellectual effort no particular satisfyingness is attached. Is it not perfectly reasonable to believe and to expect that he will come to enjoy his play more and more and his mental effort less and less? If this is true the key to successful teaching is to be found in definitely directing the character of motor and mental exercise.

Chapter II

The Experimentation and Presentation of Results.

Having found fairly satisfactory instruments for measuring the two factors under consideration in the first part of this investigation these devices were applied to three hundred pupils in the Ottawa High School.

The Terman Group Intelligence Tests A and B were given to determine the Intelligence Score or Quotient and the Englehardt device was employed to determine the Physical Index.

Employing the results thus derived a tabulation was made of the scores of one hundred thirty three (133) girls, which is shown on Chart I.

Then the scores made by one hundred sixty-five boys (165) were tabulated and these are shown in Chart II.

Then the scores of the two hundred ninety-eight (298) boys and girls combined were tabulated and are shown in Chart III.

From these the (S.D.) Standard Deviation and the Coefficients of Correlation (r) with the (P. E.) Probable Error were determined.

r is derived by the "product movement formula"

$$r = \frac{\frac{\Sigma x\, y}{n} - Cx\ Cy}{x\ y}$$

in which $C = \frac{fd\ (+)\ fd\ (-)}{n}$

in which $Z = \frac{\Sigma x^2}{n} - C^2$

$$\text{Physical Index} = \frac{\text{av. ht. of J. x wt.}}{\text{height x age}}$$

PHYSICAL INDEX GIRLS
CHART I

Intelligence Score (by Terman test)

	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20	F
130 134				1		1	1									3
125 129					3	1	1									5
120 124			1		1		1				1					4
115 119				3	1	1	2	1			1	1				10
110 114	1	3	3	3	1		3	3	2							19
105 109		2	1	6	6	1	3	1	1	3					1	25
100 104	2	3	1	6	9	4	2	1	1							29
95 99	1		1		4	4	3	1	1							14
90 94	2	1	4	2	2	2	3				1					17
85 89	2	1	2	1	1											7
8	8	10	13	22	28	14	19	6	5	3	3	1	0	0	1	133

r = .22
P. E. = ± .058

r = .22

Intelligence Score (by Terman Test)

	85 89	90 94	95 99	100 104	105 109	110 114	115 119	120 124	125 129	130 134	F
.06											2
.07											5
.08											8
.09											14
.10											22
.11											31
.12											26
.13											20
.14											20
.15											17
.16											
.17											
.18											
.19											
.20											
F	0	0	4	6	7	24	19	23	24	21	16	5	9	1	6	165

$r = .21 \pm .037$

R = .21

P.E. = .037

Intelligence Score (by Terman Test)

Intelligence Score	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20	F
130 134				1		1	1							1	1	5
125 129					3	1	1			1	1		3			10
120 124			1		1	2	3	1			1	1	2			12
115 119				4	2	4	3	4	1	1	2	1			2	24
110 114	1	3	3	3	1	4	7	7	6	2	1	1	1		1	41
105 109		2	1	6	8	6	7	5	6	10	3				2	56
100 104	2	3	2	7	9	9	5	3	4	3	5	2	1			55
95 99	1		1	2	6	8	4	4	5	3						34
90 94	2	1	5	2	2	2	6	2	6	3	4	1			1	37
85 89	2	1	4	3	3	1	1	3	1	1	2		2			24
8	8	10	17	28	35	38	38	29	29	24	19	6	9	1	7	298

$r = .16 \pm .038$

r = .16 P. E. = .038

Chapter III
Interpretation and Discussion of The Problem, and Previous Investigations.

The second phase of the investigation is a study to determine possible correlations between the mental and physical proficiencies and qualities of leadership.

The proposition of training for leadership in our public schools is a question that is being given more and more attention and consideration by educational leaders. Justification of the expenditure of effort in research to discover the above mentioned correlations is easily seen. The need of leadership is apparent and consequently the importance of emphasizing the training for leadership.

Two quite opposite opinions concerning the possibility of training for leadership exist. These two opinions or positions are expressed in two quotations that were used by Otis W. Caldwell of Columbia University in an address which is published in full in the Fourth Year Book of the National Association of Secondary School Principals under the title "Factors in the Training for Leadership." Caldwell states the following: "To be friendly, to retain respect, to praise, to preserve authority, to exact what is

due and yet deserve it, these be the qualities of a leader and cannot be taught". 19

"It is because no one has analyzed this problem into its elements and succeeded in reducing these to a series of readily assimulated principles, that industry still pins its faith to the old belief that leaders are born not made. Natural gifts have to be exercised and trained. Born leaders may develop their gifts unconsciously, but average men must do so knowingly, and preferably with guidance." 19

The significance of this as a school problem is being more and more appreciated. This recognition is being tangibly evidenced in some schools by giving credit toward graduation for extra-curricular activities and for evidences of leadership.

Thos. Finegan, in a state school survey of Pennsylvania made in 1922, points out the importance of giving consideration to this proposition. He says: "By using the situations and activities in which these young citizens naturally find themselves in the daily life

of the school, many progressive principals have made their schools laboratories for citizenship training in which the girls and boys through participation in the government of the school and the organization and administration of the extra curricular activities learn to be good citizens by practicing the arts of good citizenship.

Pupils in a democratized school learn how to get along with their fellows under conditions similar to those existing in the life of the community." 20

O. W. Caldwell in the address previously referred to said, "The real leaders emerge from the group, it is not visited upon them from without. The groups choice of leaders will vary in terms of the enterprise, but the variation is not wide. The group's choice of leaders will be confined to a very small group of its individuals. An occasional choice of a football captain or a basketball captain is made when the chosen leader is deficient in all but physical prowess. More frequently he is a good student, but more frequently still, it is likely that he is a medium student possessing other marked qualities in addition to fair scholarship. Intelligence and attainments are indispensible elements of leadership."

In a study completed in 1924, Mr. Fred Lynn of

Kansas University undertook to determine the source of leadership in the schools of Harvey Co. Kansas. 22

He undertook to answer three questions.

(1) What proportion of the pupils in the High Schools of Harvey Co. are rural and what proportion urban?

(2) How can leadership abilities be studied and measured?

(3) What quantitative relation exists between the leadership abilities of the rural pupils and that of the urban pupils?

As a measuring device Lynn developed a scale (find scale attached) by which he was able to score, qualities of leadership evidenced by these High School pupils. This scale which was made upon the basis of the weighted opinions of 275 Kansas School superintendents is a real contribution and enables an experimenter to measure qualities of leadership somewhat satisfactorily.

In his investigation Lynn found a correlation between leadership and scholarship (for the H. S. students of Harvey Co.) to be .20 ± .001, thus showing a small but positive correlation.

The Lynn Scale as a measuring device was then used to determine the before mentioned correlations.

Lynn's Table Classifying and Weighting Various School Activities to determine qualities of Leadership is as follows:

Activity	Rank	Scale Score Weighted
Pres. Student Council	1	10
Pres. of H. Y. or Girl Reserve	2	9
Editor of School Paper	3	9
Editor of School Annual	4	9
Pres. of Sr. and Jr. Class	5	9
Cap. of Football Team	6	8
Pres. of Athletic Assn.	7	8
Bus. Mgr. School Annual	8	8
Bus. Mgr. School Paper	9	8
Cheer Leader	10	7
Cap. Basket Ball Team	11	7
Part in School Play	12	7
Track Captain	13	6
Pres. Fresh. or Soph. Class	14	5
Part in Operetta	15	5
Debate Team	16	5
Chairman Y. Com.	17	5
Officer of Y not Pres.	18	4
Officer of Dept. Club	19	4
Sec'y. Treas. of Jr. or Sr. Cl.	20	4
Member of School Paper Staff	21	3
Vice Pres. Jr. or Sr. Class	22	3
Sec'y. Treas. Fr. or Soph. Cl.	23	2
Member Annual Staff	24	2
Vice P. Fr. or Soph. Class	25	1
Member of Dept. Club Com.	26	1

Chapter IV

Investigation and Presentation of Results on Leadership Traits.

In conducting the second part of this investigation. Forms as shown on page 31 were submitted to the students of the Ottawa High School with the request that they check the activities in which they had taken a part.

These were subsequently checked, scores determined and results tabulated. In as much as the opportunities for evidencing leadership are not so open to the Freshmen and Sophomores as to the Juniors and Seniors, the results tabulated were leadership scores for approximately one hundred Juniors and Seniors in the Ottawa High School.

Charts IV and V show the tabulated scores and the determination of the measures of variability and correlation.

An analysis of these results discloses the fact that a very small positive correlation exists between physical proficiency and leadership ($r = .13$) with the subjects tested. This is somewhat at variance with popularly accepted belief.

Name_____ Class_____

Please indicate by check (✓) if you have held any of the following list of offices or positions while in High School.

____ Editor of High School paper.

____ Editor of " " annual.

P___ President of Sr. or Jr. class.

____ Captain of Football team.

____ Business manager of School Annual.

____ " " " School Paper.

____ Cheer leader.

____ President of Hi-Y or Girl Reserve Club.

____ Captain of Basket Ball team.

____ Part in school play.

____ Track captain.

____ President of Freshman or Sophomore class.

____ Part in operetta.

____ Chairman of Hi-Y or Girl Reserve committee.

____ Officer of Hi-Y or Girl Reserve club (not president).

____ Secretary or Treasurer of Jr. or Sr. class.

____ Member of School Paper staff.

____ Vice-Presidentof Jr. or Sr. Class.

____ Secretary-Treasurer of Sophomore class.

____ Member of annual staff.

____ Vice-President of Sophomore class.

____ Member of Department Club Committee.

____ Officer of Departmental club (Example--Latin Club).

The second conclusion as deduced from Table V is that a larger positive correlation (r = .21) exists between leadership and intelligence scores. A significant positive correlation between these factors would be in keeping with the popular idea that leadership must be sought only among the mentally gifted. This correlation however is so small as to suggest the significant fact that those less gifted mentally can be trained for leadership. This is significant in a democratic educational program.

INTELLIGENCE QUOTIENT (Terman Test)

CHART IV

Leadership Score (Lynn's Table)

		85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	F
28	30						2	1	2			5
25	27						2	3				5
22	24				1	2	1		1			5
19	21				1	2	2					5
16	18			1			1					2
13	15		1	1		1	6			1		10
10	12				4	4			3			11
7	9		1	2	7	5	3	2	1		1	22
4	6		2	2	7	7	2	3	1	1	1	25
1	3					1	1					2
F		0	4	5	20	22	20	9	8	2	2	92

$r = .21 \pm .067$

r = .21 P. E. = .067

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CHART V

Leadership Score (Lynn's Table)

Leadership Score	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20	F
28 30			1	1	1	1	1		1		1					5
25 27				1				1	1						1	4
22 24					1	1		1	1							4
19 21			1				1			1	1					5
16 18					1					1						2
13 15			1		1		1	1	3		1		1			8
10 12				1	3	1	1		1	1			1		1	11
7 9			3	2	2	3	3	2	3	1	2	1				19
4 6			3	4	4	5	6	3	2	2						29
1 3		1					1		2	1						5
F	1	1	6	8	13	11	12	8	14	7	5	1	2	0	3	92

$r = .13 \pm .07$

$r = .13$ P. E. $= .07$

S U M M A R Y

An examination of the tabulated and charted results of the investigation will reveal the following findings:

(1) Charts I, II, and III which are tabulations of the Physical Index Scores and the Mental Proficiency Scores reveal the fact that a small coefficient of correlation of approximately (.2) has been shown to exist between physical and mental proficiency as determined by the Englehardt device and the Terman Group Test, taking age, weight and height into consideration.

(2) The investigation further reveals as shown by the above mentioned charts that this correlation is substantially the same for boys and girls.

(3) The second part of the investigation reveals as shown in charts IV and V that a small but possibly significant correlation exists between Intelligence Quotients and Leadership scores and a very small positive correlation exists between Physical Proficiency and Leadership scores.

(4) The study also reveals that a considerable interest has been manifested in this general field but that only a very little real investigation has been done.

C O N C L U S I O N

According to the criteria used in this study there is slight correlation between physical and mental proficiency scores. Possibly, additional studies with still larger numbers of subjects might reveal that this correlation is even more pronounced. If a really significant correlation exists, it might be suggested that it is really worth while to give proper consideration to the careful analysis and direction of the physical side in Education.

The Study according to the criteria reveals a small correlation between Physical Proficiency scores and Leadership scores still further emphasizing the importance of the physical in any Educational program.

The correlation between Leadership scores and Mental Proficiency indices while not particularly high suggests the importance of the proper consideration of individual differences. It may be argued on one hand that the intellectually superior will attain success without any particular assistance and on the other hand that in as much as the intellectually superior will furnish the leadership he should be given the most consideration.

This phase of the study suggests the significance of additional study with larger numbers and over a longer period of time and with possible refined instruments of measurement.

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